BACKGROUND ON ELECTRONIC HEALTH RECORDS FOR SMALL PRACTICES

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Introduction

Our country and especially the health care industry have recently expressed a great deal of interest in electronic health records (EHRs). However, the concept of EHRs is not a new idea. In the early 1990s there was an initiative for use of Computerized Patient Records (CPRs), which have evolved into EHRs. For many reasons, implementation of such systems was not widespread in the 1990s. The reasons included:

- a lack of technological standards;
- difficulty in using the systems; and
- system cost.

There is significant evidence that implementation of EHRs across the health care system can improve the provision of cost-effective quality care and improve the health status of the population. In addition, many of the technological impediments are being addressed. As a result, it appears that the health care system now is poised to broadly implement EHRs over the next 10 years.

This white paper reviews the current status of EHRs. It is intended to provide background for those exploring the implementation of EHRs in a variety of small to medium sized settings. The white paper includes:

- a discussion of the costs and benefits of EHRs;
- how to finance implementation of EHRs; and
- the current state of the EHR industry.

What Is an Electronic Health Record?

The idea of an EHR has been around for many years. It has been referred to as a Computerized Patient Record (CPR), an Electronic Medical Record (EMR), and most currently as an EHR. Over time the concept has evolved, and an EHR is viewed as a broad record of a patient's health history, status and treatment, owned or at least controlled in part by the patient, and used by the patient's health care providers with the permission of the patient.

The vision for EHRs is sweeping:

- *EHRs will provide a comprehensive view of all patient information.*

  o When a patient sees a new physician or other health care provider, the patient will not have to attempt to remember his or her medical history, including all current and past conditions, treatments, and medications. The EHR should represent a complete view of a patient's medical history. For example, patients arriving at the emergency department will not have to try to remember current medications and allergies: the EHR should have a history of medications and all allergies available at the point of care and easily accessible in emergent situations. All of this information will be available in the EHR electronically for payment, treatment, and health care operations and, for other purposes, with the authorization of the patient. It will even be possible for a patient to carry his or her complete medical record, including laboratory results, x-rays, CT scans, and other relevant information, on a "memory stick" on his or her key chain. This permits the EHR to be portable and with the patient at the point of care.

- *Quality of care will be improved.*

  o *Physicians will more easily be able to review the "complete" medical record.* Each patient's medical information will automatically be incorporated into a coordinated format by the EHR to make it easier to find and use relevant information and identify missing needed information, e.g., screening tests and immunizations.

  o *An appropriately configured EHR will provide "alerts" and "notices" to help health care providers incorporate best practices into patient treatments.* The practice of medicine becomes more and more complex as our knowledge about appropriate treatments continues to expand. "Best practices" are defined and refined for a wide variety of conditions.[1] There are over 2,000 practice "guidelines" that have been developed by reputable medical organizations.[2] These practice guidelines, based on "evidence-based medicine," often are very complex, with what is best for a patient with a particular condition depending on a variety of factors, including the patient's history, the patient's family's history, other conditions of the patient and patient medications, and the availability of different modes of treatment in a community. No physician is able to keep up with all the latest practices and apply them to the particular conditions of each of his or her patients.

Sweeping Vision for EHRs

EHRs will provide a comprehensive view of all patient information.

Quality of care will be improved.
- Physicians will more easily be able to review the "complete" medical record.
- An appropriately configured EHR will provide "alerts" and "notices" to help health care providers incorporate best practices into patient treatments.
- Medical errors can be reduced.

Treatment costs will be reduced.
Administrative costs will be reduced.

Public health will be improved.

EHRs will have the ability to search all information in the patient's record, including the patient's medical history and all past and current test results, and based on the latest medical practices, alert the health care provider of additional factors they should consider when making treatment decisions. Alerts may range from fairly simple notices regarding immunizations or recommended screening tests to more complex issues. For example, based on the patient's history (or family history), an EHR might identify the need for additional tests prior to making a diagnosis or treatment recommendation. To truly improve patient health, these "alerts" or "rules" need to be based on best practices developed by medical specialty societies and must be focused on the provision of quality care, not cost containment. If configured correctly, these "alerts" and "rules" will not be hard and fast, and physicians and other health care providers will have the ability to override them, if that is appropriate.

Given that a best practice exists for a particular treatment, every EHR should incorporate the same "alerts" and "rules." Toward that end, EHRs should not incorporate different best practices: all should be based on the currently accepted evidence-based medicine literature. Given that best practices are refined almost daily, some mechanism will need to be developed to ensure EHRs are kept current and up to date with the latest treatment protocols.

  o *Development of best practices will be enhanced.* EHRs will eventually amass a huge volume of information. Harvesting information from EHRs, with appropriate privacy protections, will allow the collection of a wealth of information related to particular diagnoses and disease processes. This information can be used to track patients over longer periods of time and to develop the next

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[1] See Agency for Healthcare Research and Quality (AHRQ) at http://www.ahrq.gov/clinic/.
[2] Ibid.

generation of evidence-based best practice protocols. This can be accomplished much more quickly and less expensively than is possible using paper records spread among a variety of providers.

- o *Medical errors can be reduced.* EHR "alerts" can help to identify problems before they occur. In addition, EHRs may be linked with computerized patient order entry (CPOE) systems. Such systems reduce the need for written orders which are subject to transcription errors. CPOE systems also can be used at the patient's "bedside" to verify that the appropriate test is being performed or medication provided, both increasing the efficiency of the system and reducing adverse outcomes.[3]

- *Treatment costs will be reduced.* When accurate patient records are readily available, baseline information is available. This can eliminate the need for costly duplicative tests and help health care providers make informed decisions regarding a patient's treatment. Among other things, knowing a patient's mediations can prevent adverse drug interactions. In addition, having baseline information, e.g., an EKG, can help identify or rule out particular diagnoses. Medical liability costs also may be reduced with better documentation. In fact, some medical liability insurance companies now offer discounts to health care providers with an EHR.

- *Administrative costs will be reduced.* This will occur in a number of ways.

- o When the medical encounter is in electronic form, it should be possible to *automatically pull the clinical information needed to submit a claim.* Specifically, the claim must be supported by the medical record, including both the type and level of services billed and the diagnoses. Combining an EHR with a practice management system should create a "complete" claim that is ready for submission at the conclusion of each encounter or procedure.

- o When a payor needs additional information to adjudicate a claim, it requests clinical information. This information is contained in the EHR. It should be possible to efficiently pull the information from the EHR and submit it to the payor as an electronic "claims attachment." (The Claims Attachment is one of the Administrative Simplification's Transaction and Code Set standards currently under development by the Centers for Medicare and Medicaid Services of the Department of Health and Human Services.) This should help to ensure the appropriate information is provided efficiently and expedite the claims adjudication process and "medical necessity" determinations.

- o Orders for tests, treatments, and prescriptions can be automatically and accurately forwarded to the appropriate provider reducing the need for providers to produce paper orders. In addition, a provider receiving an electronic order should be able to automatically read the order into the EHR, along with relevant medical records information, speeding the documentation process and reducing ordering errors.

- *Public health will be improved.* Automatic reporting and compilation of reportable and suspicious diseases will automatically and immediately be reported to public health authorities to alert officials of a disease outbreak or a potential bioterrorism attack.

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[3] See Institute of Medicine at http://www.iom.edu/focuson.asp?id=8089 and AHRQ http://www.wedi.org/cmsUploads/pdfUpload/eventsPresentationInformation/pub/CurrentIssuesInPatientSafetyBattles.pdf.

Barriers to Widespread Adoption of EHRs

Lack of standards

Health care providers have found purchasing and implementing EHRs costly

Health care providers have been able to customize EHRs only at a significant cost.

Heath care providers often have not trusted the reliability, privacy, and security of EHRs.

Of course, all of this must be accomplished in a secure environment that ensures the privacy of patient records.

There have been many barriers to the widespread adoption of EHRs. These include:

- *The lack of standardization* has made it difficult and costly for different EHR systems to communicate with one another, and much of the benefit from EHR implementation is the ability to electronically gather the patient's complete record.

    o The standards involve the manner in which patient information is stored, the terminology used to store the information, and the procedures for exchanging the information among the various systems.

- *Health care providers have found purchasing and implementing EHRs costly* – both in monetarily and time terms. The return realized by health care providers has not often been apparent. This remains a concern.

- *Health care providers have been able to customize EHRs only at a significant cost.* Even with customization, health care providers often are told that they have to change the manner in which they practice medicine. Patient exams and procedures must be more structured as health care providers input data into the EHR in the required – mandated – order, and jumping from screen to screen to enter information "on the fly" as often is done in a paper medical record can be difficult. In addition, some EHRs "tell" physicians how to practice medicine, and often in a manner that is not consistent with what the physicians believe is best practice.

- *Heath care providers often have not trusted the reliability, privacy, and security of EHRs.* They do not trust electronic records and are concerned that records may be lost or inappropriately altered without their knowledge.[4]

Of course, most health care providers also recognize that there are many problems with paper records; however, for most health care providers the costs associated with paper records have not been high enough to justify the expense of implementing an EHR.

Financing Electronic Health Records – Costs and Benefits

One of the biggest issues surrounding EHRs is the cost: who will benefit and who will pay. From *a provider perspective*, the costs can be significant and the benefits to the provider may or may not offset those costs.

- In a small practice, the individual provider or small group of providers usually need to do the following: investigate various EHRs, determine which, if any, make sense for the practice (including

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[4] An article in the California HealthCare Foundation's June 9, 2004 iHealthBeat focused on doctors concerns over the British National Health Service's implementation of a national patient record system. According to the article, "Some British doctors are opposing a plan to create a database of patient records for the National Health Service unless patients first consent…. Even if patients opt out, their data will still be in the database in de-identified form, available only in emergencies."

addressing such issues as interoperability), come up with the capital to purchase the EHR system and all necessary hardware, interface the EHR with the practice's office management software, take time to customize the EHR so it works for the practice, train all workforce members, and convert at least some of its paper records to the EHR. This is a daunting task for practices that are overwhelmed with administrative hassle and facing the constant pressure of lower payments from the government and other third party payors. Most practices have lack the technical ability, financial resources, and time to implement an EHR.

> From *a provider perspective*, the costs can be significant and the benefits to the provider may or may not offset those costs.

- o Customizing the EHR can be a significant issue, and customization may be limited by the EHR software and the resources available to the practice. To the extent the EHR is organized differently from the manner providers are used to/trained to treat patients, e.g., the screens do not "flow" in the same order as the providers are used to treating patients, providers may have to "reengineer" treatment processes. While not necessarily a bad thing, such "reengineering" will be met with resistance, unless the benefits are clear.

Of course, there also are benefits to practices. The level of these benefits depends on many factors, including the type of practice and the practice environment. For example:

- o A high volume primary care practice may be able to cut down administrative overhead by automatically generating bills. On the other hand, many primary care practices do not submit many claims. Rather, they use a "superbill" and simply check off the services provided and any diagnoses. Payment is due at the time of service (and calculated by a quick glance at the superbill). It is up to the patient to bill insurance, which often does not cover such primary care services.

- o In a specialty practice, the EHR may also reduce administrative hassle. In this case, however, the administrative hassle may relate to gaining approval for payment for necessary tests and procedures. It may be easier and more efficient for a practice to extract the relevant information from a patient's record and transmit it to a payor for prior approval or to substantiate the need for the services (i.e., to send an electronic claims attachment). On the other hand, the volume of requests from payors may be relatively small from many specialty practices that tend to provide services to a fairly small number of patients when compared to a primary care practice.

- o All practices will be able to refer to an integrated EHR (at least in theory). This will enable new providers to simply verify patient history and current medications (as opposed to having to record all of this information) and to review all recent tests and procedures. This may enable providers to speed up visits or to spend more time listening to patients and less time writing the medical record.

- In a hospital the costs and benefits may differ. A hospital is a more complex organization which treats patients over a prolonged period of time. Accurate and efficient order entry for tests, procedures, and drugs, better scheduling, and timely availability of test results and a reduction in lost test results all increase quality of patient care and reduce hospital costs. In the emergency department, having baseline information on patients can speed the treatment process and often rule out or speed up the determination of diagnoses. Much of this cost reduction goes directly to the hospital's bottom line: many hospitals are paid a per-case rate for many patients. The more efficient

the provision of care, the more likely the hospital is to cover its costs. This assumes, of course, that the hospital has the necessary capital to make the investment in the first place.[5]

From a *payor perspective*, including government and business, which ultimately pays for most of the health care provided in this country, EHRs may be very beneficial.

> From a *payor perspective*, including government and business, EHRs may be very beneficial.

- Payors will be able to get more information electronically. This should enable them to more efficiently adjudicate claims (including claims attachments) and review quality of care, including HEDIS[6] and other measures. These administrative efficiencies should reduce health plan costs.

- EHRs should reduce the need for repetitive tests, reduce the occurrence of lost or delayed test results, speed up the diagnosis of patients, and help to guide providers to give appropriate care to patients. In addition, EHR alerts and notifications should help to improve patient safety, e.g., by adequately taking account of allergies, family history, current medications, and current diagnoses. Better information should result in better care and helping reduce the costs of health care resulting in lower premiums for purchasers and getting patients back to work more quickly.[7]

From a *patient perspective*, EHRs may provide a significant benefit.

- Physicians and other health care providers will have a more complete picture of each patient, especially over time as each patient's EHR medical history expands. Most importantly, a patient will

> From a *patient perspective*, EHRs may provide a significant benefit.

not have to reconstruct his or her medical history each time he or she sees a new provider. The providers could simply confirm the information in the EHR. This includes current medications and allergies, which can be confusing for many patients, particularly those with multiple conditions. Such information may improve patient safety, e.g., by reducing the number of adverse drug interactions. In addition, having ready access to all test results and being able to compare test results over time is a valuable source of information that will enable providers to better diagnose and treat patients in a timely manner without the need for repetitive tests.

- As the EHR becomes more complete, providers, with the assistance of EHR alerts and notifications, will be better able to determine the preventive and routine tests, immunizations, and procedures needed by patients. For instance, it will no longer be a manual process to determine the date of the last tetanus shot or mammogram or if there is a family history of colon cancer leading to a

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[5] One Chicago-area hospital recently completed implementation of a $40 million-plus EHR. It estimates that it will save $10 million annually. It states: "The new system is substantially enhancing patient care. The turnaround time for obtaining test results has fallen significantly, with mammograms now taking a day compared to up to three weeks, and cardiographics reports dropping from as long as 10 days to one day. Entire categories of medication errors and potential errors have been eliminated, including transcription errors, errors due to misunderstood abbreviations and mix-ups due to look-alike drug names. In addition, delayed administration of patient medications has decreased 70 percent while omitted administration of medications has dropped 20 percent across the organization due to the electronic medication administration records and system tools that alert nurses of new patient orders and of overdue medications." See http://www.enh.org/press/releases.asp?id=2433.

[6] See http://www.ncqa.org/Programs/HEDIS/.

[7] Keep in mind that employers pay premiums for many employees. Accordingly, business has an interest in getting employees back to work as soon as possible. In addition, employers are the ultimate payors in many instances. They either buy insurance and pay for premiums or they have ERISA health plans and pay the claims directly, usually using the services of third party administrators (TPAs).

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recommendation that the patient get a colonoscopy prior to age 50. This kind of information has the ability to greatly increase the health status of the population.

Keep in mind that it is not necessary to start with a comprehensive EHR system. Significant benefits can be gained from implementing parts of the EHR. For example, computerized patient order entry (CPOE) in a hospital can significantly impact medication errors, increasing patient safety and reducing medication errors. ePrescribing can have a similar impact in the practice environment. It is important to ensure that whatever EHR components are implemented serve as a basis for moving forward and will not have to be replaced with incompatible systems when a more complete EHR is implemented.

Financing Demonstrations

There are a few demonstration projects where payors are helping too finance implementation of EHRs.

- Some payors have recognized that moving providers toward EHRs can improve patient care and business processes. For example, WellPoint announced an initiative earlier this year to provide $40 million in information technology to doctors.[8] The initiative will "help physicians improve patient care, achieve greater efficiency and realize cost savings for America's health care system. This initiative provides almost 19,000 contracting network physicians … with new technologies designed to enhance the quality of patient care, reduce administrative costs and improve physician communications with patients and pharmacists."

  WellPoint is providing selected physicians with a "prescription improvement package" or a "paperwork reduction package." While not a complete EHR, WellPoint has determined that these initial steps will help reduce its costs – presumably the benefits outweigh the costs – and will be accepted by many physicians.

- Some employers – the ultimate payors for most private health insurance in this country – also are interested in promoting the use of EHRs. For example, "Bridges to Excellence" (BTE) is a not-for-profit entity formed by General Electric, Proctor and Gamble, Ford Motor, Verizon, UPS, and other employers to "create significant advances in the quality of health care by … developing reimbursement models that encourage the recognition of health care providers who demonstrate that they have implemented comprehensive solutions in the management of patients and deliver safe, timely, effective, efficient, equitable and patient-centered care which is based on adherence to quality guidelines and outcomes achievement."[9]

  One component of BTE is the Physician Office Link program. According to BTE, "physicians who use information technology in their offices consistently tell us how much easier it is to deliver the highest quality, most efficient care…. Through Physician Office Link, Bridges to Excellence wants to help doctors invest in their practices by sharing the savings that come from technology upgrades that support better care." Physicians can receive an annual bonus of up to $50 per patient if they "demonstrate that they have implemented certain electronic systems for managing care in their practice." BTE estimates the savings from these systems "are about 4% to 5% of the total cost of care – and that the improvement in the quality of care will be even more significant."

- The federal government also is pursuing a number of initiatives. The CMS efforts in this area are discussed below (see page 10).

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[8] See http://ir.wellpoint.com/phoenix.zhtml?c=82476&p=irol-newsArticle_general&t=Regular&id=484649&.
[9] See http://www.bridgestoexcellence.org/bte/index.html.

Current Interest in Electronic Health Records

Presidential Interest

In his *2004 State of the Union*, President Bush stated:

> By computerizing health records, we can avoid dangerous medical mistakes, reduce costs, and improve care.

On *April 26, 2004*, the White House outlined its plans.[10] Specifically, President Bush outlined a plan "to ensure that most Americans have electronic health records within the next 10 years" and established a "Health Information Technology Plan" to "address longstanding problems of preventable errors, uneven quality, and rising costs in the Nation's health care system."

> "By computerizing health records, we can avoid dangerous medical mistakes, reduce costs, and improve care."
> President Bush
> *2004 State of the Union*

According to the White House Executive Order, the adoption of EHRs will address a number of challenges to the health care system, including moving innovation and "discoveries" from "the laboratory bench to the bedside," reducing "preventable errors, uneven health care quality, and poor communication among doctors, hospitals, and many other health care providers involved in the care of any one person, and using technology in health care in a manner similar to other American industries for the benefit of patients."

The President's goal is "assuring that most Americans have electronic health records within the next 10 years." This means that "complete health care information is available for most Americans at the time and place of care, no matter where it originates" and that "electronic health records will be designed to share information privately and securely among and between health care providers when authorized by the patient."

To achieve his goal, the President took a number of steps to "urge coordinated public and private sector efforts that will accelerate broader adoption of health information technology": adopting uniform health information standards, increased funding for health care information technology demonstration projects (to $100 million), using the Federal government (as the largest purchaser of health care) to "foster the adoption of health information technology," and creating a new, sub-cabinet position of National Health Information Technology (HIT) Coordinator. The President issued an *Executive Order on April 27, 2004*, formally directing the Secretary of Health and Human Services to establish "within the Office of the Secretary the position of National Health Information Technology Coordinator."[11]

On *May 6, 2004*, the Secretary of HHS, Secretary Thompson saying that "health information technology has the potential to greatly improve health care even as it yields huge savings," named David J. Brailer, M.D., Ph.D.,[12] to serve as National HIT Coordinator.[13] As stated in the press release:

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[10] See http://www.whitehouse.gov/infocus/technology/economic_policy200404/chap3.html and "Remarks by the President in a Conversation on the Benefits of Health Care Information Technology Department of Veterans Affairs Medical Center Baltimore, Maryland" (http://www.whitehouse.gov/news/releases/2004/04/20040427-5.html).

[11] See http://www.whitehouse.gov/news/releases/2004/04/20040427-4.html.

[12] According to the press release, Dr. Brailer was "a senior fellow at Health Technology Center in San Francisco, where he has advised various regional and national efforts on IT and health information exchange. He previously served for 10 years as chairman and CEO of CareScience Inc., one of the nation's leading health care management companies. While at CareScience, Dr. Brailer designed and oversaw the development of the health information

Dr. Brailer, a national leader in harnessing health IT to promote safe, quality and efficient health care, will head a new office at HHS, created by a directive from President Bush. The office will support efforts across government and in the private sector to develop the standards and infrastructure to allow more effective use of information technology to promote higher quality care and reduce health care costs. One of the office's first tasks will be to study options to create incentives in Medicare and other HHS programs to encourage the private sector to adopt interoperable electronic health records. It is estimated that a national health information network can save about $140 billion per year through improved care and reduced duplication of medical tests.

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President's Information Technology Advisory Committee

In June 2004 the President's Information Technology Advisory Committee (PITAC) released a report entitled "Revolutionizing Health Care Through Information Technology."[14] The report focuses on the need for an EHR "for all Americans that provides every patient and his or her caregivers the necessary information required for optimal care while reducing costs and administrative overhead"; "computer-assisted clinical decision support to increase the ability of health care providers to take advantage of state-of-the-art medical knowledge"; computerized provider order entry; and "secure, private, interoperable, electronic health information exchange, including both highly specific standards for capturing new data and tools for capturing non-standards-compliant electronic information from legacy systems." PITAC presents 12 recommendations to "address the technical issues in some detail":

- Economic incentives are needed to promote investment in health information technology. PITAC recommends increased federal support, particularly "where benefits are not directly returned to those who must invest in IT solutions." As discussed above, this is a real concern for many health care providers (see Financing Electronic Health Records – Costs and Benefits, page 4).

- Health information exchange standards are essential, particularly when patients receive care from different health care providers. In the absence of standards, EHRs cannot exchange information with one another. This is discussed further below (see National Health Information , page 14).

- Current laws should be changed to facilitate the sharing of EHR technologies among health care providers. Currently such systems often are not shared due to "current interpretations of anti-fraud and anti-kickback laws." This is related to financing EHRs.

- Federal health IT investments should be leveraged through the development of a "single set of standards for EHR systems that can be implemented across all federally implemented EHRs and shared with the private sector." In effect, if the federal requirement sets voluntary standards for EHR vendors wanting to do business with the government, vendors will have no choice but to comply with the standards and they will become widespread in the private sector. Keep in mind that almost all health care providers treat federally funded patients through the Medicare and Medicaid programs.

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exchange technology implemented in Santa Barbara County, Calif. Dr. Brailer holds doctoral degrees in both medicine and economics."

[13] See http://hhs.gov/news/press/2004pres/20040506.html.

[14] See http://www.hpcc.gov/pitac/reports/20040721_hit_report.pdf.

At some point these programs might require or financially encourage the use of EHRs meeting the federal standards. This could occur in the context of ongoing quality improvement programs and data reporting.

- A standardized clinical vocabulary needs to be developed. This is discussed below (see CHI Initiative, page 16).

- A single set of data standards for the most common forms of clinical information needs to be developed. Specifically, to be truly interoperable EHRs need to be "based on a common information architecture with highly standardized data definitions … [to] enable computer-aided decision support, automated medical-error detection, and rapid patient-population analysis."

- An efficient human-machine interface needs to be developed. One of the key issues with implementing EHRs is that EHRs often require physicians and other health care providers to make significant changes in the way they approach patients and analyze problems. They may be forced into entering data in a certain (new) order and may not be able to address issues, particularly ancillary issues, in the manner in which they are accustomed. While changing processes may improve patient care, it requires an extensive educational/retraining program and a significant cultural change.

- Coordination of National Health Information Newtork (NHIN) development across the federal government is necessary. The government must ensure that all departments and agencies are moving in the same direction so that EHRs will be interoperable.

- Patients need to be identified unambiguously. It is important to ensure that EHRs accurately exchange information on specific patients, and unique patient identifiers are needed for this purpose. This is a controversial area that must be addressed.

- Encrypted Internet communications should be implemented. This will ensure patient information is communicated securely and in a consistent fashion.

- There must by a trust hierarchy and strong authentication. Use of a public key system will ensure authentication and non-repudiation.

- Access requests must be traced. Such audit trails are necessary to ensure the security of EHRs and the confidentiality of EHR-based patient information.

CMS Interest

The Centers for Medicare and Medicaid Services have a number of initiatives focused on promoting the use of EHRs:

- The purpose of the *physician focused quality initiative*[15] is to: "(1) assess the quality of care for key illnesses and clinical conditions that affect many people with Medicare, (2) support clinicians in providing appropriate treatment of the conditions identified, (3) prevent health problems that are avoidable, and (4) investigate the concept of payment for performance." It has two key parts: the Doctor's Office Quality (DOQ) Project and

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[15] See http://www.cms.hhs.gov/quality/pfqi.asp.

the Doctor's Office Quality Information Technology (DOQ-IT) Project.[16] The DOQ-IT Project

> promotes the adoption of electronic health record (EHR) systems and information technology (IT) in small-to-medium sized physician offices with a vision of enhancing access to patient information, decision support, and reference data, as well as improving patient-clinician communications.
>
> Quality measures developed in the Doctors' Office Quality (DOQ) project will be reported by participating practices in DOQ-IT via standardized EHR platform to the QIO Clinical Warehouse. The QIO Clinical Warehouse will receive, review and validate electronically transmitted information regarding practitioner performance and identify opportunities for improvement.

- CMS is implementing the *Chronic Care Improvement Program* (CCIP).[17] The CCIP is mandated by the Medicare Modernization Act passed in 2003. CMS is selecting organizations that "will offer self-care guidance and support to chronically ill beneficiaries." CMS expects organizations to "rely on innovative uses of IT equipment, including electronic monitoring, records, prescribing and alerts, to help them carry out their programs."[18] As stated in the Federal Register Notice announcing the CCIP[19]:

> Many chronic care improvement programs have developed integrative information infrastructures, new applications of information and communication technologies, expert clinical systems that incorporate evidence-based guidelines for multiple conditions, and predictive modeling capabilities to support their operations. Others have been working to develop interoperative electronic health records and other health information technology used at the point of care to improve quality and safety. We [CMS] are interested in receiving applications from organizations that have proven to be successful in applying tools to meet the individual needs of participants and their providers, reduce fragmentation in patient information, and facilitate better communications between chronically ill beneficiaries and their providers at the point of care.

- In May 2004 *CMS awarded $100,000* to the American Academy of Family Physicians (AAFP) to support provision of "comprehensive, standardized electronic health record (EHR) software to the health care community."[20]

Veteran's Administration

On July 21, 2004, CMS and the Department of Veterans Affairs (VA) announced they are planning to make available to physicians, hospitals, and other health care providers the VA's electronic health record program. The intent is to make "it easier for the private-sector health care industry to make use of this electronic system for health care records."[21] The system is called VistA-Office Electronic Health Record. According to CMS and the VA:

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[16] See http://www.doqit.org/doqit/jsp/index.jsp.
[17] See http://www.cms.hhs.gov/medicarereform/ccip/.
[18] See http://www.cms.hhs.gov/media/press/testimony.asp?Counter=1048.
[19] See http://www.cms.hhs.gov/medicarereform/ccip/solicitation.pdf.
[20] See http://www.cms.hhs.gov/media/press/release.asp?Counter=1075.

VistA was chosen because it is in the public domain and is a software package that is flexible and robust. The system is used in 1,300 diverse sites of care and services 5 million veterans annually. Most importantly, however, over the 20 years that VistA has been in use, VHA developed the Computerized Patient Record System (CPRS), clinician interface, into a well-defined and documented clinical data repository with a powerful, physician-oriented toolset.[22]

Due to additional needs in private practice, VistA will be enhanced to provide "physician-office patient-registration; interface to existing billing systems; and reporting of quality measures."[23]

It is expected that private-sector health care providers will be able to obtain VistA at nominal cost during the later half of 2005. The low cost is being set to encourage physicians to implement a high quality EHR program. According to the VA: "VistA offers health care providers a complete electronic record covering all aspects of patient care, including reminders for preventive health care, electronic entry of pharmaceutical orders, display of laboratory results, consultation requests, x-rays and pathology slides."

A "Usability Test" of VistA is being conducted by CMS. It is starting in December 2004, and the test is intended to ensure that the VistA product works appropriately in the private sector.

Physicians' Electronic Health Record Coalition

The American Medical Association and 13 other national medical organizations formed the Physicians' Electronic Health Record Coalition (PEHRC) in July 2004.[24] The goal of the PEHRC

is to improve the quality, safety and efficiency of health care by facilitating adoption of affordable, standards-based EHR and other health information technology. The PEHRC, which will assist physicians primarily in small- and medium-sized ambulatory care practices, will educate physicians about the value and best use of EHR and help focus the market on high quality and affordable products. In addition to aiding physicians, the PEHRC will also work to participate in the development of the EHR certification process.[25]

> The AMA and 13 other national medical organizations formed the Physicians' Electronic Health Record Coalition (PEHRC).

Apparently the PEHRC is planning to release specific EHR recommendations by the end of 2005. The recommendations will reportedly be an easy to use format that will allow physicians to contrast and compare EHRs. The review will apparently be specialty specific, so physicians will be able to evaluate EHRs that may be a better fit for their specific specialty.[26]

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[21] See http://www1.va.gov/opa/pressrel/docs/Vista.doc.

[22] See http://www.cms.hhs.gov/quality/VistAQsAs.pdf .

[23] *Ibid.*

[24] Other members include American Academy of Family Physicians, American Academy of Neurology, American Academy of Ophthalmology, American Academy of Pediatrics, American College of Cardiology, American College of Emergency Physicians, American College of Obstetricians and Gynecologist, American College of Osteopathic Family Physicians, American College of Physicians, American College of Rheumatology, American Osteopathic Association, American Psychiatric Association and the American Urologic Association.

[25] See http://www.ama-assn.org/ama/pub/article/1615-8718.htm.

[26] See http://www.hcpro.com/content/43461.cfm.

Other Organizations

Many other organizations are turning their attention to EHRs. A sampling of some of the key players, not already referenced above, is as follows:

- The *Medical Records Institute's (MRI)* has taken a lead on EHRs.[27] MRI works to "promote and enhance the journey towards electronic health records, e-health, and mobile health, and related applications of information technologies (IT)." MRI holds many conferences and seminars, including its annual Toward an Electronic Patient Record (TEPR) focused on e-health and clinical IT issues. TEPR provides practical educational programs and allows attendees the opportunity to evaluate system vendors. More than 150 companies had exhibitions at TEPR 2004. MRI also has a number of workgroups and a series of useful publications related to EHRs.

- The *Healthcare Information and Management Systems Society (HIMSS)* has an EHR Initiative.[28] The HIMSS EHR Initiative "seeks to assume a leadership role in furthering integration and interoperability of an Electronic Health Record (EHR)." HIMSS has developed an extensive list of positions, white papers, and reports addressing various issues related to EHRs. One key resource is the CPRI Toolkit.[29] The Toolkit "outlines general principles and provides 'best practice' examples of how healthcare providers should manage the security of their paper and electronic records."

- The *California Healthcare Foundation* (CHF) has a health information technology initiative.[30] The initiative is aimed at helping "to accelerate the adoption and use of new information technologies in health care … to realize the potential of the Internet for improving clinical and business practices through better communication and access to information." Toward that end CHF is involved in a number of activities and has drafted a number of reports.

- The *eHealth Initiative* seeks improvement "in the quality, safety, and efficiency of healthcare through information and information technology."[31] One of its principal foci is Connecting Communities for Better Health (CCBH). CCBH promotes programs converting paper-based medical records to an electronic model and the use of health information technology to transfer information across institutions.

- *Connecting for Health* is addressing barriers to "development of an interconnected health information infrastructure."[32] Connecting for Health is addressing the "policy, technical and legal barriers to establishing an interconnected health information infrastructure and to promote its potential benefits."

- Accrediting bodies also are starting to take a look at EHRs. *URAC* announced in May 2004 that it was "convening a research and focus group to explore new quality benchmarks for health information technology (HIT), including the possibility of developing standards addressing electronic health records (EHRs) and/or the infrastructure of HIT systems."[33]

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[27] See http://www.medrecinst.com/.
[28] See http://www.himss.org/asp/issuesbytopic.asp?TopicID=15.
[29] See http://www.himss.org/asp/cpritoolkit_toolkit.asp.
[30] See http://www.chcf.org/programs/ihealth/.
[31] See http://www.ehealthinitiative.org/.
[32] See http://www.connectingforhealth.org/.
[33] See http://www.urac.org/news_release.asp?navid=news&pagename=news_releases&id=1058.

- Organized medicine is taking an active interest. The *American Academy of Family Physicians (AAFP)* has established a Center for Health Information Technology.[34] AAFP realizes health information technology is playing a growing role in health care. The Center was established to "underscore the need of small and medium-sized medical practices for low-cost, standards-based information systems to replace the cumbersome and inefficient paper records currently in use."

- Continuity of Care Record: EHRs minimize the health care encounters where practitioners do not have access to patient history and recent treatment. Several national groups have come together to develop a *Continuity of Care Record (CCR)*.[35] The groups are:

  o ASTM International
  o Massachusetts Medical Society;
  o American Academy of Family Physicians; and
  o HIMSS.

  The minimum data set within the CCR is intended to enhance continuity of care by providing the most relevant patient information, including diagnoses, recent procedures, allergies, medications, recent care provided, recommendations for future care, and reasons for a referral or transfer. The goal is to create a CCR that will enable the next provider to easily access relevant information at the beginning of a first encounter and easily update and pass on the information when the patient goes to another provider. While this is not a true EHR system, CCR is aimed at involving significant numbers of clinicians, enabling them to exchange relevant information electronically in a standardized format, and helping them learn the value of the electronic exchange of patient information.

National Health Information Network

Building a "National Health Information Network" (NHIN)[36] is key to the success of EHRs.[37] The NHII is the result of many public and private organizations acknowledging the continuing crisis confronting health care delivery in the United States:

- Information is not interchangeable.
- Healthcare errors are not reported.
- There is a lack of standardization.

The NHIN is to be a network of systems, technologies, standards, applications policies, and procedures that will

> Building a NHIN is key to the success of EHRs.

provide "anywhere, anytime" electronic health information and will support all facets of individual health care and promote public health. NHIN is being coordinated and facilitated by the Assistant Secretary for Planning and Evaluation (ASPE) in HHS. There are no laws or regulations mandating NHIN on the health care industry.

According to HHS, the NHIN is:

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[34] See http://www.aafp.org/x24654.xml.
[35] See http://www.massmed.org/pages/ccrfaq.asp.
[36] The NHIN has been referred to as the National Health Information Infrastructure (NHII). The use of NHIN appears to be replacing NHII.
[37] See http://aspe.hhs.gov/sp/nhii/.

a system that would allow a doctor or other health care provider to access an always-up-to-date electronic health record for a patient who has authorized it, regardless of when and where the patient receives care. This would not be a national database, but rather a set of standards and secure networks that would allow a doctor or hospital to immediately gather relevant information by computer network – such as test results, x-rays and medical history as well as clinical guidelines, drug labeling and current research findings – to best treat an individual patient.

The NHIN will provide the backbone necessary to support the use and expansion of EHRs. According to HHS, the National HIT Coordinator will face several tasks related to building the NHIN[38]:

Key Issues Facing National HIT Coordinator

Privacy and security
Incentives for use of health information technology
Common medical language
Defining the function of an EHR
Use of common HIT standards by federal agencies
Development of local health information exchanges
Funding to highlight how health information technology can improve quality of care and patient safety

- *Privacy and security* are key to the success of EHRs. Patients and providers must be assured that EHRs will be kept private – confidential. In addition, appropriate and reasonable security must be implemented in a manner that allows business processes, especially the provision of health care, to proceed in an efficient and timely fashion. The National HIT Coordinator "will prepare a report for the Secretary on privacy and security issues related to the development of a national health information infrastructure and to recommend methods to assure appropriate authorization, authentication and encryption of data to protect the privacy and confidentiality of personal health information."

- *Incentives for use of health information technology* must be developed. Currently most health care providers still do not have enough incentive to switch from paper to electronic health records. The National HIT Coordinator will look at "options to create incentives in Medicare and other HHS programs to encourage the adoption of interoperable health information technology." In addition, the Office of Personnel Management will "report on similar options for encouraging the adoption of such technology through the Federal Employee Health Benefit Program." It is hoped that appropriate incentives can be implemented to make it worthwhile for many more health care providers to adopt EHRs.

- A *common medical language* is needed to ensure "interoperability" of EHRs. Specifically, EHRs need to able to "talk" to each other using a common language. Right now there is no common language used by all EHR vendors. HHS is moving forward in this important area with the Consolidated Health Informatics (CHI) Initiative. The CHI Initiative is discussed further below.

- It is necessary to define the *function of an EHR.* Health Level 7 (HL7) has established a draft standard defining the set of functions needed for an electronic medical record. This defines standards for transmitting complete EHRs among different EHR systems developed by various vendors.[39]

- Use of *common HIT standards by federal agencies* is needed. As mentioned above, the federal government is the largest purchaser of health care services. HHS (Medicare and Medicaid) is working with the Departments of Defense (CHAMPUS) and Veterans Affairs (CHAMPVA) to "adopt health information standards for use by all federal health agencies." The CHI Initiative is a

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[38] See http://www.hhs.gov/news/press/2004pres/20040427a.html.
[39] More information on HL7 can be found at http://www.hl7.org/ehr/.

major component of this effort. It is likely that the requirement to meet certain standards in order to do business with the federal government will drive the entire market to meet those "voluntary" standards. After all, few health care providers do not do business with the federal government.

- *Local health information exchange* must be developed, as health care is local. Toward that end the President's proposed 2005 budget includes $50 million "to support state and local efforts to develop systems for exchanging of health information in their communities." These local demonstration projects are "a key part of a national health information infrastructure."

- Projects will be funded to *highlight how health information technology can improve quality of care and patient safety.* HHS' Agency for Healthcare Research and Quality (AHRQ) has $50 million to fund such projects this year and the President has requested an additional $50 million for FY 2005. In fact, AHRQ has recently announced the awarding of a variety grants and contracts related to health information technology totalling $139 million. [40]

HHS also has a significant number of other efforts aimed at "harnessing health information technology." These initiatives may all link to EHRs, including bar codes on drugs, a new BioSense initiative to detect outbreaks and bioterrorism, ePrescribing as required by the Medicare Modernization Act, adopting national standards for public health information, telemedicine initiatives in remote and rural communities, and an Indian Health Service EHR.

Regional Health Information Organizations

Health care is local. It is provided in local communities and, for the most part, people receive the vast majority of their health care is a single geographic area. Accordingly, it is expected that local implementations of the NHIN will occur in various communities in ways that are unique to its medical trading area. It is a goal of the NHIN that national standards be adopted in the development of local networks. By doing such, the local initiatives may evolve into the NHIN over a period of years.

Toward that end, it is expected that Regional Health Information Organizations (RHIOs) will form to implement the NHII\N in specific local geographic areas. As health care is predominantly local, the NHIN will really be made up of a number of number of initiatives brought about by the RHIOs. RHIOs also give the local community some say and control in the deployment of technology to meet its local needs. As stated in DHHS' "Framework for Strategic Action," RHIOs "are critical to health information exchange that reflects the health care priorities of a local area as well as the legitimacy and trustworthiness of this activity to clinicians and consumers."[41]

CHI Initiative

As stated above, a *common medical language* is needed to ensure "interoperability" of EHRs. Specifically, EHRs need to able to "talk" to each other using a common language. Right now there is no common language used by all EHR vendors. The federal government is moving forward with the Consolidated Health Informatics (CHI) Initiative.[42] The purpose of the CHI Initiative is to identify appropriate, existing data standards and to endorse them for use across the federal health care sector. These standards will be used by all federal agencies as they update, develop and implement new health information technology systems.

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[40] See http://www.ahrq.gov/research/hitfact.htm.
[41] See "Framework for Strategic Action," page 17 (http://www.hhs.gov/onshit/framework/hitframework.pdf).
[42] See http://www.whitehouse.gov/omb/egov/gtob/health_informatics.htm.

The CHI Initiative was established to ensure that federal agencies with health-related missions can "share their health information. This health data sharing will enable them to make significant strides towards improving patient safety, reducing error rates, lowering administrative costs, and strengthening national public health and disaster preparedness." Toward that end, the agencies were charged with adopting common clinical vocabularies and standard methods for transmitting that information. "[I]nteroperability through standards will enable us to share a common electronic patient medical record and in turn greatly improve the quality of US healthcare." [43]

About 20 federal department/agencies are involved in the CHI Initiative. This includes HHS, the VA, the Department of Defense, the Social Security Administration, and the General Service Administration.

On March 21, 2003, the first set of standards was announced.[44] As stated in the press release, HHS adopted the following 5 standards:

- Health Level 7 (HL7) messaging standards to ensure that each federal agency can share information that will improve coordinated care for patients such as entries of orders, scheduling appointments and tests and better coordination of the admittance, discharge and transfer of patients.
- Certain National Council on Prescription Drug Programs (NCDCP) standards for ordering drugs from retail pharmacies to standardize information between health care providers and the pharmacies (already adopted under the Health Insurance Portability and Accountability Act (HIPAA)).
- The Institute of Electrical and Electronics Engineers 1073 (IEEE1073) series of standards that allow for health care providers to plug medical devices into information and computer systems that allow health care providers to monitor information from an ICU or through telehealth services on Indian reservations, and in other circumstances.
- Digital Imaging Communications in Medicine (DICOM) standards that enable images and associated diagnostic information to be retrieved and transferred from various manufacturers' devices as well as medical staff workstations.

CHI Initiative Standards

Health Level 7 (HL7) messaging standards
HL7 vocabulary standards for demographic information
HL7 vocabulary standards for units of measure
HL7 vocabulary standards for immunizations
HL7 vocabulary standards for clinical encounters
HL7 Clinical Document Architecture standard for text based reports
National Council on Prescription Drug Programs (NCDCP) standards for ordering drugs from retail pharmacies
Institute of Electrical and Electronics Engineers 1073 (IEEE1073) series of standards that allow for health care providers to plug medical devices into information and computer systems
Digital Imaging Communications in Medicine (DICOM) standards
Laboratory Logical Observation Identifier Name Codes (LOINC)
College of American Pathologists Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT) for laboratory result contents,
SNOMED CT for non-laboratory interventions and procedures
SNOMED CT for anatomy
SNOMED CT for diagnosis and problems
SNOMED CT for nursing
Health Insurance Portability and Accountability Act (HIPAA) transactions and code sets
Federal terminologies related to medications, including Food and Drug Administration's names and codes for ingredients, manufactured dosage forms, drug products and medication packages, the National Library of Medicine's RxNORM for describing clinical drugs
Veterans Administration's National Drug File Reference Terminology (NDF-RT)
Human Gene Nomenclature (HUGN)
Environmental Protection Agency's Substance Registry System for non-medicinal chemicals

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[43] See http://www.whitehouse.gov/omb/egov/gtob/health_informatics.htm.
[44] See http://hhs.gov/news/press/2003pres/20030321a.html.

- Laboratory Logical Observation Identifier Name Codes (LOINC) to standardize the electronic exchange of clinical laboratory results.

On May 6, 2004, HHS provided an update on the CHI Initiative.[45] Fifteen new standards were adopted. As stated in the press release, the fifteen standards are as follows:

- Health Level 7 (HL7) vocabulary standards for demographic information, units of measure, immunizations, and clinical encounters, and HL7's Clinical Document Architecture standard for text based reports. (Five standards)
- The College of American Pathologists Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT) for laboratory result contents, non-laboratory interventions and procedures, anatomy, diagnosis and problems, and nursing. HHS is making SNOMED-CT available for use in the United States at no charge to users. (Five standards)
- Laboratory Logical Observation Identifier Name Codes (LOINC) to standardize the electronic exchange of laboratory test orders and drug label section headers. (One standard.)
- The Health Insurance Portability and Accountability Act (HIPAA) transactions and code sets for electronic exchange of health related information to perform billing or administrative functions. These are the same standards now required under HIPAA for health plans, health care clearinghouses and those health care providers who engage in certain electronic transactions. (One standard.)
- A set of federal terminologies related to medications, including the Food and Drug Administration's names and codes for ingredients, manufactured dosage forms, drug products and medication packages, the National Library of Medicine's RxNORM for describing clinical drugs, and the Veterans Administration's National Drug File Reference Terminology (NDF-RT) for specific drug classifications. (One standard.)
- The Human Gene Nomenclature (HUGN) for exchanging information regarding the role of genes in biomedical research in the federal health sector. (One standard.)
- The Environmental Protection Agency's Substance Registry System for non-medicinal chemicals of importance to health care. (One standard.)

Full copies of the CHI Initiative reports on adoption of each of these standards can be found at http://www.whitehouse.gov/omb/egov/gtob/health_informatics.htm.

The adoption of these standards represents a significant step forward. While not required by law, any vendor and possibly any health care provider wanting to do business with the federal government will have to consider use of these standards. Given that the federal government is the largest purchaser of health care services in the country, it is likely that many vendors will voluntarily adopt these standards and many health care providers will demand EHRs and other products that incorporate these standards. This will promote interoperability between EHR systems.

What Should Small to Medium Sized Practices Look for in an EHR System?

There are many EHR systems on the market. They are designed differently, function differently, and include a variety of features. Following is a discussion of what to consider when selecting an EHR. Keep in mind:

- There is no "ideal" system. Every system will have some "shortcomings."

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[45] See http://hhs.gov/news/press/2004pres/20040506.html.

- What is best for one physician or health care provider may not be best for another physician or health care provider, e.g., different specialties may find different EHRs preferable.

- Choosing an EHR will require tradeoffs. Different systems will have different attractive features, and no single EHR should be expected to excel in all areas.

EHR Features

There are a variety of ways to look at EHR features.
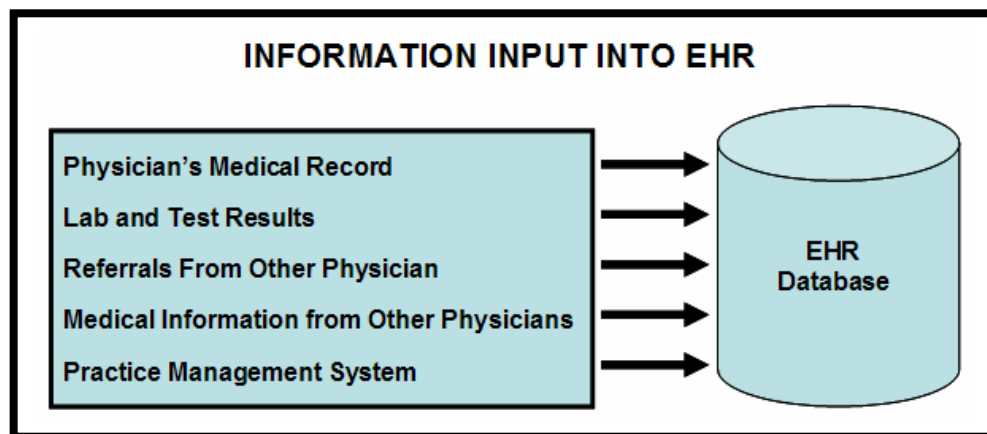
> There is no "ideal" system.

- It is possible to look at a high level, e.g., does the EHR provide an alert for each patient when the clinician signs into the account?
- It is also possible to look at a very specific level, e.g., does the EHR alert provide specific allergy, condition, history, problems, and prescription information?
- What specific data elements are provided?
- Can that information be tailored by the practice, and by each different provider in the practice?
- Can the practice set preventive care alerts and vary criteria for such alerts, or are the preventive care alerts predetermined based on preset "best practices"?

The following approach to reviewing EHRs takes a middle ground. It recognizes that initially EHRs must be reviewed at a higher level; however, it also provides some more specific questions and issues to take into consideration. The approach seeks to address the key features in an EHR, not all the features. *It does not provide a detailed nor complete list of questions.* Many of these features are drawn from the Institute of Medicine report "Crossing the Quality Chasm: A new Health System for the 21st Century."

1. The EHR should provide a ***problem list***. Specifically, the EHR should allow the physician or other health care provider to view the problem status for each patient for each visit or encounter. More specifically:
   o The problem descriptions should be clear and standardized (preferably standardized using a generally accepted coding system).
   o Each problem should be linked to all related patient orders, test results, prescriptions, etc.
   o It should be easy to view a complete historic problem list, along with all associated relevant patient information.
   o Ideally the problem list, along with the services provided, should meet CPT and ICD-9 coding documentation requirements.
   o The list of current problems, including allergies, treatments, medications, and any urgent alerts should come up automatically when a clinician opens a patient record.

2. The EHR should measure ***health status and functional levels***.
   o The EHR should use the SF-36 or some similar health status measure.[46] Such measures help to evaluate a patient's health over time.
   o The EHR should allow the clinical to add additional the health status measures.

3. The EHR should provide a centralized location for documenting ***clinical reasoning and rationale***.

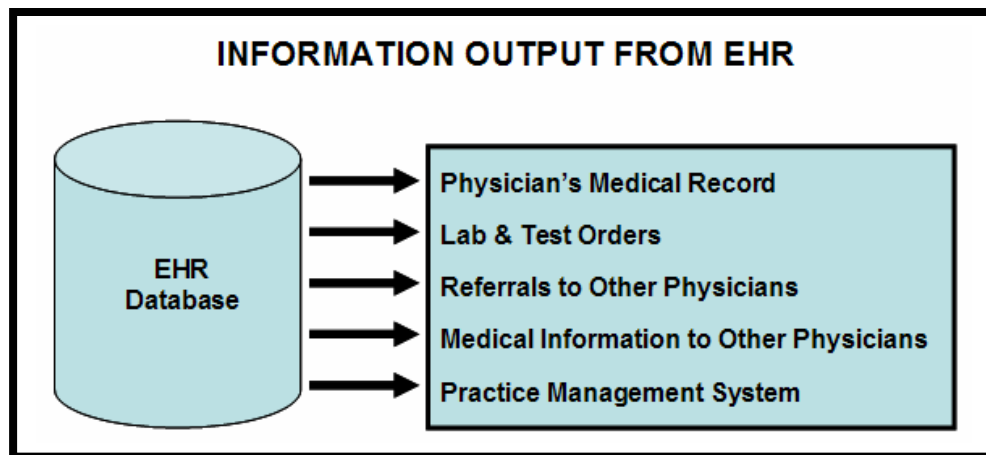[46] "Health" can be defined by a matrix of several measures. These include (1) independence in the activities of daily living, (2) mental well-being, (3) social function, and (4) the absence of symptoms (e.g., pain). SF-36 is a tool that calculates these measures based on a series of 36 questions. These 36 questions can be answered by patients prior to seeing the physician and entered into the EHR.

- o While the clinical reasoning and rationale area of the EHR should allow for free text, it must provide for data input into a structured data base. This will allow the tracking and analysis of patients over time.
- o The information in the structured data base should be automatically analyzed for each patient at the time of entry to assist in "decision making," e.g., to provide treatment suggestions and information (and supporting rationale) based on the clinical data entered and clinical practice guidelines built into the EHR.
  - ▪ The EHR should provide links to the practice guidelines for reference purposes.

4. The EHR should *link patient records over time from various sources*. One of the big problems with the current health care delivery system is the fragmentation of patient records. Even when records are centralized, it often is difficult to sort through information when presented in different formats from a variety of sources. To be truly useful, the relevant information from the various sources must be incorporated into the EHR.
- o The EHR should be able to incorporate patient information from various sources. Ideally, this should occur in an electronic – system to system – fashion. Test results should be reviewed and automatically entered into the EHR. After all, every keystroke increases to possibility of errors, and automated system-to-system entry will reduce the errors.

INFORMATION INPUT INTO EHR

Physician's Medical Record → EHR Database

Lab and Test Results →

Referrals From Other Physician →

Medical Information from Other Physicians →

Practice Management System →

- o It is important to have the relevant data entered into the EHR, not simply accompanying the EHR, e.g., a scanned historical medical record. The EHR should have the ability to track patient problems and treatments over time and to provide timely alerts. If the information is not actually entered into the patient record, then it cannot be included in any practice guideline reviews built into the EHR.
- o The EHR needs to track the source of each piece of information. It is important to know if the information was collected by the clinician or received from an outside (secondary) source. This is true of medical records and tests, so the clinician can get back to the source of the information if any questions arise.
- o Similarly, the EHR should have the ability to send electronic information to other EHRs to facilitate care by referring and consulting physicians and support professionals.
- o The EHR should be able to link test orders with test results, and test results and procedures with the specific problems necessitating those tests and procedures.

5. The EHR should *ensure privacy and security* of patient information, as required by HIPAA, including audit trails. This issue has been addressed extensively in conjunction with HIPAA privacy and security implementation.

- o The EHR needs to provide a system whereby each individual accessing the EHR logs on individually. Related to this, the EHR should have audit trail capabilities to monitor who is accessing, entering, and signing off on data.
  - ▪ Ideally the EHR should support strong authentication such as a biometric device to be used for ease of logging on and verifying the identity of the individual entering or accessing the EHR information.
- o The EHR should use electronic signatures to ensure the records are reviewed and signed as appropriate.
- o The EHR should be write once, read many (WORM). All medical records should be written and signed, and while they may be amended, information previously entered should never be erased or changed.
- o The EHR should allow the clinician to document restrictions on the release of specific information and to ensure that such information is not released without explicit review. This includes "sensitive" information such as mental health treatments, HIV/AIDS status, and genetic testing.
- o The EHR should allow the clinician to ensure confidentiality and to restrict access on an element by element basis, if necessary

INFORMATION OUTPUT FROM EHR

EHR Database →
- Physician's Medical Record
- Lab & Test Orders
- Referrals to Other Physicians
- Medical Information to Other Physicians
- Practice Management System

6. The EHR should be *customizable* so different users can *view information* in the manner that is best for them. Each individual in the practice may want a different view or may need different information. To be most useful, the relevant information should be presented for each user. For example, a nurse in the pediatric office should be able to sign on and see information regarding what shots, tests, etc. the physician has ordered so she knows how to proceed. The physical therapist needs to see the PT order and needs to enter therapy notes. In addition, different physicians may want different views.
   - o It is important to understand if it is straightforward or complex to configure views for each individual. Ideally the EHR should have templates and menus to assist the practice in this process. It is also possible vendor employees must accomplish this customization. If this is the case, find out if customization is included in the purchase price or if it costs extra.

7. The EHR should be *accessible* on an as needed basis.
   - o The EHR needs to be available quickly – at least as quickly as paper records, and hopefully much quicker. Determine how long it takes to access a patient record.
   - o Determine if a physician or someone else can open a second patient's record without having to close the first one.

o   Determine if more than one person in the office can view a patient's record at the same time. This may be particularly important when getting a consult or giving direction to another staff member.
o   The EHR should allow health care providers to access patient information remotely. This is a substantive advantage over paper records. Determine if the EHR allows remote access and, if so, how the EHR ensures only appropriate individuals can securely access the information.

8. The EHR should **assist clinicians with collecting all relevant information**. Physicians and other health care providers need to document a great deal of information. Sometimes it is difficult to collect all of the relevant information, especially when asking another set of questions is dependent on something in the patient's history that may be stored away in the patient's medical record.
o   The EHR should assist the clinician and ensure that all relevant information in entered into the EHR. The EHR should support this capability with clinical guidelines. In many instances a clinical guideline may require additional information, possibly a test, to determine a diagnosis or treatment protocol.

9. The EHR should **assist physicians and other health care providers with clinical care**. One of the key attributes of an EHR is that it can provide support to clinicians based on all of the information in the EHR. This support should be based on clinical guidelines developed by clinicians and accepted by national specialty societies.

THE EHR SHOULD:
Provide a problem list.
Measure health status and functional levels.
Provide a centralized location for documenting clinical reasoning and rationale.
Link patient records over time from various sources.
Ensure privacy and security of patient information, as required by HIPAA, including audit trails.
Be customizable so different users can view information in the manner that is best for them.
Be accessible on an as needed basis.
Assist clinicians with collecting all relevant information.
Assist physicians and other health care providers with clinical care.
Support payer-specific information.
Be used by clinicians for all encounters.
Support quality assurance activities.
Track practice costs.
Use common medical language.
Use the standards developed by the CHI Initiative.
Support image storage and multimedia.
Use "icons" and drawings to speed up data entry.
Interface with the practice's financial management system.

o   The EHR should provide timely reminders and alerts, including generating notices to patients regarding the need for services, tests, and follow ups, and should alert the clinician if test results are not received in a timely fashion.
o   The EHR should have the capability to review all of the information in a patient's record, including historical information, and assist the physician or other heath care provider in making a diagnosis and a determination of how to proceed.
▪   As mentioned above, the EHR should provide links to the practice guidelines for reference purposes.

10. The EHR should **support payer-specific information**. Payers often have different requirements related to what they will cover and under what conditions. In general this can be difficult to track. At a minimum the EHR should allow health plan drug formularies to be downloaded and should assist the physician in prescribing an appropriate medication.

11. The EHR should be **used by clinicians for all encounters**. To be truly useful, physicians and other health care providers need to directly enter patient information into the EHR on a real-time basis. The EHR can only assist with clinical care if information in entered as the patient is treated.
o   The EHR must be accepted by clinicians and must be provider-friendly. This will require that the EHR be customizable as discussed above. Different specialties and kinds of practices may need

different EHR modules. Even within a single practice, each physician may want the information customized. In addition, clinicians may want the data entry screens modified to collect certain information in a certain order.

- o The EHR must be user friendly, and it must be easy and intuitive to get between screens to enter information in the manner and order that works best for the clinician.
  - ▪ The EHR must be easily customizable to meet each physician's or other health care provider's needs, particularly the workflow of the practice. If it is not, then clinicians will not use the EHR.
- o As mentioned above, it is important to understand if it is straight forward or complex to configure the EHR for each individual. Ideally the EHR should have templates and menus to assist the practice in this process. It is also possible that this customization must be accomplished by vendor employees. If this is the case, find out if customization is included in the purchase price or if it costs extra.
- o The EHR should support the use of hand-held wireless devices, including tablet PCs that may facilitate data entry by clinicians.
- o The EHR should support voice dictation and uploads from other devices.

12. The EHR should *support quality assurance* activities. The EHR will track patients over time. It will contain information on symptoms, diagnoses, treatment, comorbidities, and outcomes.

- o The EHR should have the capability to analyze how the practice treats patients with specific symptoms or diagnoses and the outcomes of those treatments. When combined with information from other practices' EHRs, this information will be useful in analyzing and developing updated best practice guidelines.

13. The EHR should *track practice costs*. Most small and medium sized practices do not track the costs of caring for patients. Larger practices often estimate the costs of treatment using statistical models.

- o The EHR should enable practices to monitor and print reports regarding the specific services being provided to each patient, the time involved in treating each patient – including follow-up for reviewing tests, etc., and the mix of services used and ordered by each clinician. This will enable the practice to better manage its expenses. In the case of managed care contracts, the practice should be able to bring actual utilization reports and cost information to the table to support its need for higher reimbursements or to make a determination that it can no longer afford to support a particular contract that pays an inadequate rate.
- o The EHR should provide cost-effective alternatives for consideration when a clinician develops a treatment plan.

14. The EHR should use *common medical language*. The EHR can use any terminology that makes sense to a clinician when the clinician views the information. However, the data base supporting the EHR must use a common clinical vocabulary. This allows the information to be shared between EHRs: If each EHR codes each unique service, disease, and symptom identically, then the EHRs can more easily exchange information with each other.

- o The EHR should use the standards developed by the Consolidated Health Informatics (CHI) Initiative (see page 16).
- o If the EHR does not use the CHI Initiative standards, determine if the vendor is planning to migrate to those standards. If it is, how soon will this occur, and will information entered into its current EHR be easily transferred to the upgraded EHR? If the vendor is moving slowly or the information will not transfer easily, it may be best to consider a different EHR.

15. The EHR should *support image storage and multimedia*.

o The EHR must allow for the storage of all information that might otherwise be stored in a paper film, or digital record. This includes images, e.g., x-rays, CT scans, and EKGs, as well as multimedia, e.g., ultrasounds.
o Images and multimedia can use a lot of computer storage space. Make sure the EHR stores this information efficiently and uses appropriate compression technologies.

16. The EHR should *use "icons" and drawings to speed up data entry*. Often it is easier to point and click than to enter text.
   o The EHR should allow clinicians to point and click on icons and diagrams in order to generate text and enter information into the patient's record. This can be particularly helpful when evaluating various systems, describing wounds and rashes, etc.

17. The EHR should *interface with the practice's financial management system*. There is a lot of information common to both the EHR and the practice's financial management system. Ideally this information can be entered once for both systems.

Web-based EHRs

Some physicians and other health care providers might find it advantageous to have a web-based EHR. Specifically, it may reduce the need to buy new hardware and software and may make maintaining the EHR much simpler: The EHR can be maintained and updated off-site by the EHR web-hosting company. A web-based EHR also may make accessing the EHR easier for clinicians, particularly those with multiple locations and those who want to remotely access records after hours. Finally, a web-based EHR may be easier to share with other clinicians who need access to a patient's information.

While this may be attractive, there are many concerns. Two of the biggest concerns relate to the security of the EHR, particularly access to each patient's EHR, and Internet connectivity: the clinician will need a high-speed connection, particularly if they wish to store and view images and video files.

The following should be considered in addition to the above considerations:

1. The EHR should *provide direct benefits over a PC-based EHR*.
   o The EHR should be easy to install.
      ▪ Does the practice need to reconfigure its computer system, or is the current hardware acceptable?
      ▪ Does the practice need to add any/many new programs and files to its computer, or is everything done remotely via an Internet browser?
   o The EHR should be easy to access and use.
      ▪ The processes for logging on to the EHR should be simple and straight forward. It also should be secure (see below).
   o The EHR should be accessible on a timely basis.
      ▪ The response time for a web-based EHR will not be as good as a PC-based EHR. It is important to ensure that the EHR response time is fast enough that the clinician is not spending a great deal to time waiting for the EHR. This is particularly true if the information going to and from the EHR is encrypted (see below).

2. As mentioned above, any EHR must meet the HIPAA *privacy and security requirements*. Given the fact that with a web-based EHR information will be accessible over the Internet, additional privacy and security concerns arise with web-based EHRs that need to be addressed.
   o The EHR should be able to grant and prohibit access to records based on specific user IDs.
   o The EHR should audit all access to the EHR as well as revisions to the data.

- o Information is passed over the Internet on an ongoing basis. Use of transmission encryption should be incorporated into the EHR.
- o The EHR should use public-private key encryption or some similar system to ensure non-repudiation and authentication.
- o The EHR Internet site needs to be secure.

Company Experience

There are a wide variety of considerations when choosing an EHR company. It is important to ensure the company has experience with EHRs and has proven its current EHR product works. Physicians and other health care providers should only purchase an EHR from an established company, with a good track record, that can be expected to be around and in the EHR business for years to come. If the company goes out of business or stops supporting and updating the EHR, the EHR may become outdated and need to be replaced at significant expense.

1. How long has the company been in existence?

2. How long has the company been selling its current EHR product?

3. How many installs does the company have for its current EHR product?

4. How many physicians and other health care providers are using the current EHR product?
   - o At a minimum call practices similar to yours and get background on the system. Ideally you may want to visit a site or two to see an actual implementation.

EHR Cost

It is important to ensure the EHR can be implemented at an acceptable cost. The full cost involves the purchase price of the EHR, the costs to implement and customize the EHR, and ongoing support, maintenance, and upgrades.

1. How many hours of on-site training and configuration are included in the purchase price, and is this sufficient to implement the EHR?

2. What is the cost of the annual maintenance and support contract? What is included in the contract and are there additional costs that are likely to be incurred?

3. Does the annual support contract include new releases and upgrades?

4. Is the EHR priced per practice or per physician? If per physician, are there additional charges for additional professional staff members, e.g., a nurse, PA, or PT?

5. Is support and maintenance available 24/7? Is it included in the purchase price or is there an additional cost?

Survey of Electronic Health Records

This white paper will be expanded over the next few months to contain reviews of a number of actual EHR products. These products will be reviewed based on the EHR characteristics listed above. In addition, the EHRs will be compared with one another. The goal is to provide a few good examples of

the variety and scope of current EHR systems. Based on this information, it is hoped that small practices will be better able to evaluate and make decisions regarding how to proceed with EHR implementation.

Organizational Recommendations

Many other organizations are looking at making specific recommendations. Recommendations and updates will be reported as they are developed.

American Medical Association and PEHRC: As mentioned above, the AMA and 13 other national medical organizations formed the Physicians' Electronic Health Record Coalition (PEHRC) in July 2004.[47]   The PEHRC is planning to release specific EHR recommendations by the end of 2005. The recommendations will reportedly be in an easy to use format that will allow physicians to contrast and compare EHRs. The review will apparently be specialty specific, so physicians will be able to evaluate EHRs that may be a better fit for their specific specialty.[48]

Medical Group Management Association: The December 8, 2004 *MGMA Washington Connexion*[TM] contained an articles entitled "MGMA to initiate comprehensive electronic health record survey." The article states:

> In the next few weeks, the MGMA Center for Research will be surveying thousands of group practices regarding their use of health information technology, with a focus on electronic health records (EHR). This comprehensive survey is funded through a grant provided by the Agency for Health Care Research and Quality. The results of the survey will provide important feedback on the current use of health information technology and barriers that practices face as they explore the adoption of EHR. In addition, this project will help MGMA identify opportunities to assist groups implement EHR and other health information technology. Medical groups receiving a survey are strongly urged to complete it.

Comments

Please submit comments on this White Paper to Andrew H. Melczer, Ph.D., Vice President, Heath Policy Research, Illinois State Medical Society, at melczer@isms.org.

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[47] Other members include American Academy of Family Physicians, American Academy of Neurology, American Academy of Ophthalmology, American Academy of Pediatrics, American College of Cardiology, American College of Emergency Physicians, American College of Obstetricians and Gynecologist, American College of Osteopathic Family Physicians, American College of Physicians, American College of Rheumatology, American Osteopathic Association, American Psychiatric Association and the American Urologic Association.

[48] See http://www.hcpro.com/content/43461.cfm.

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